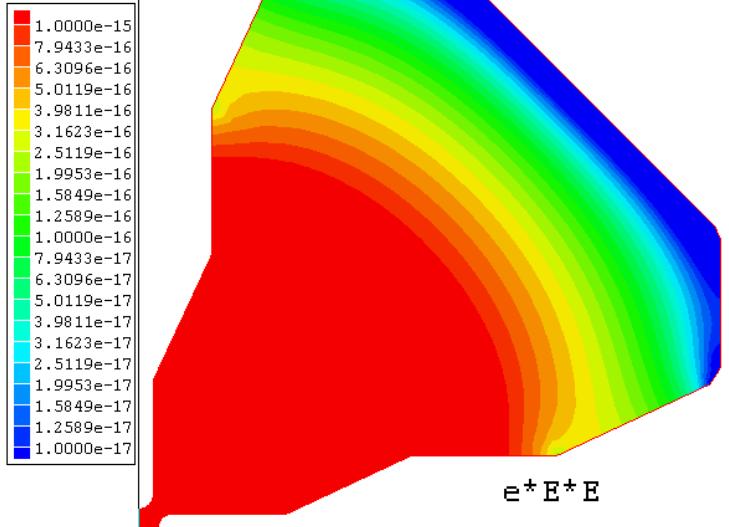
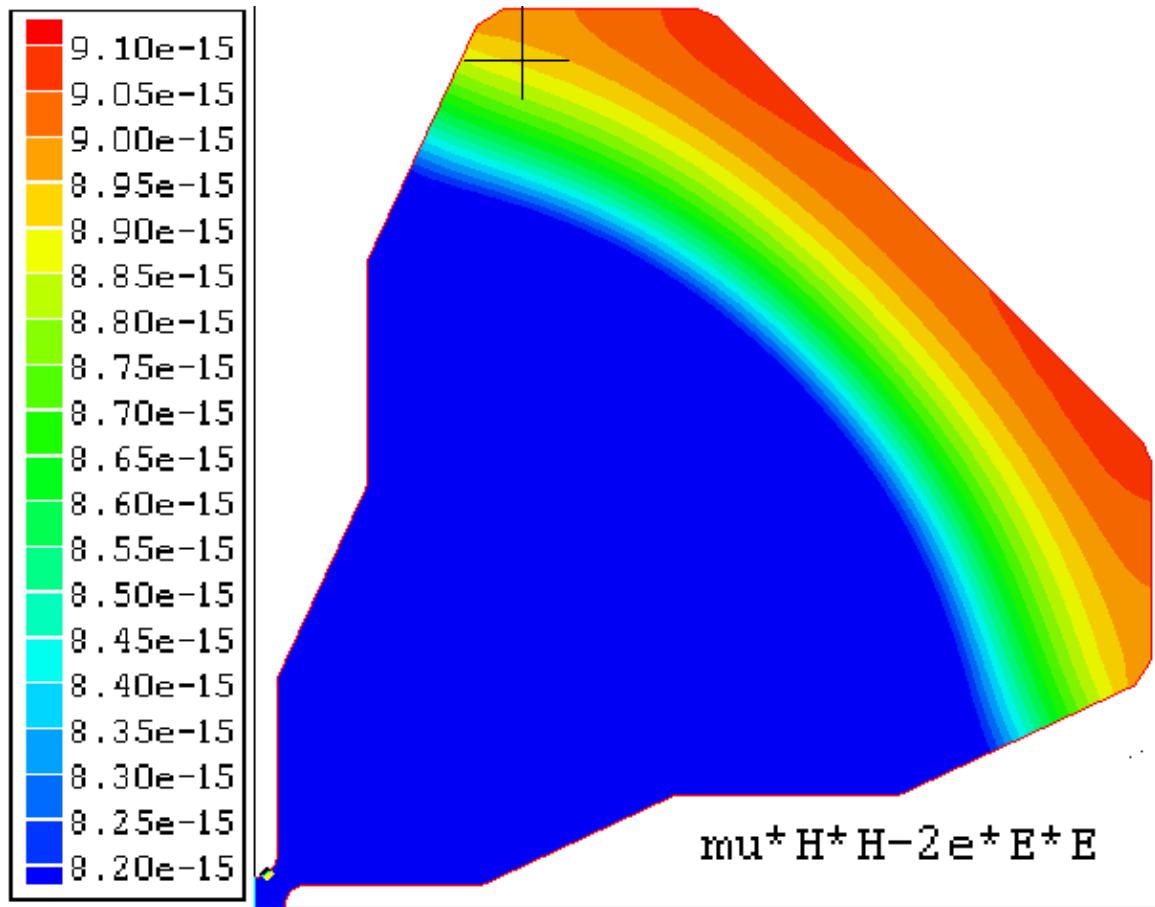
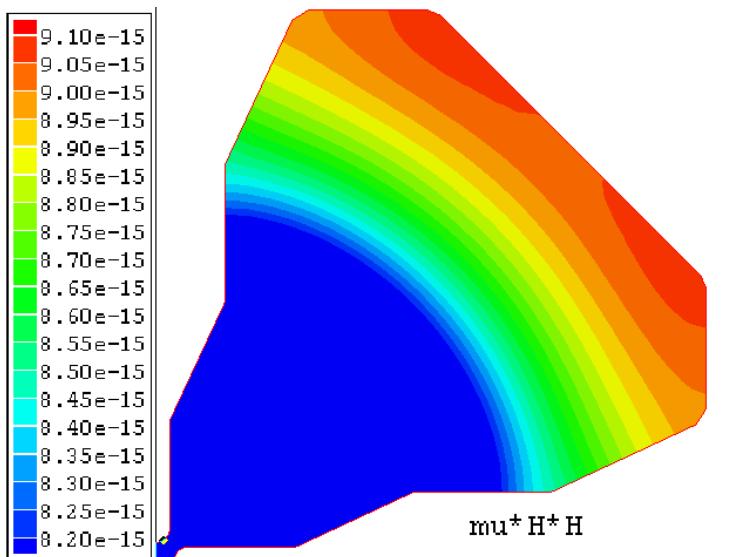


Bead-pull sensitivity on bead position, HFSS data.



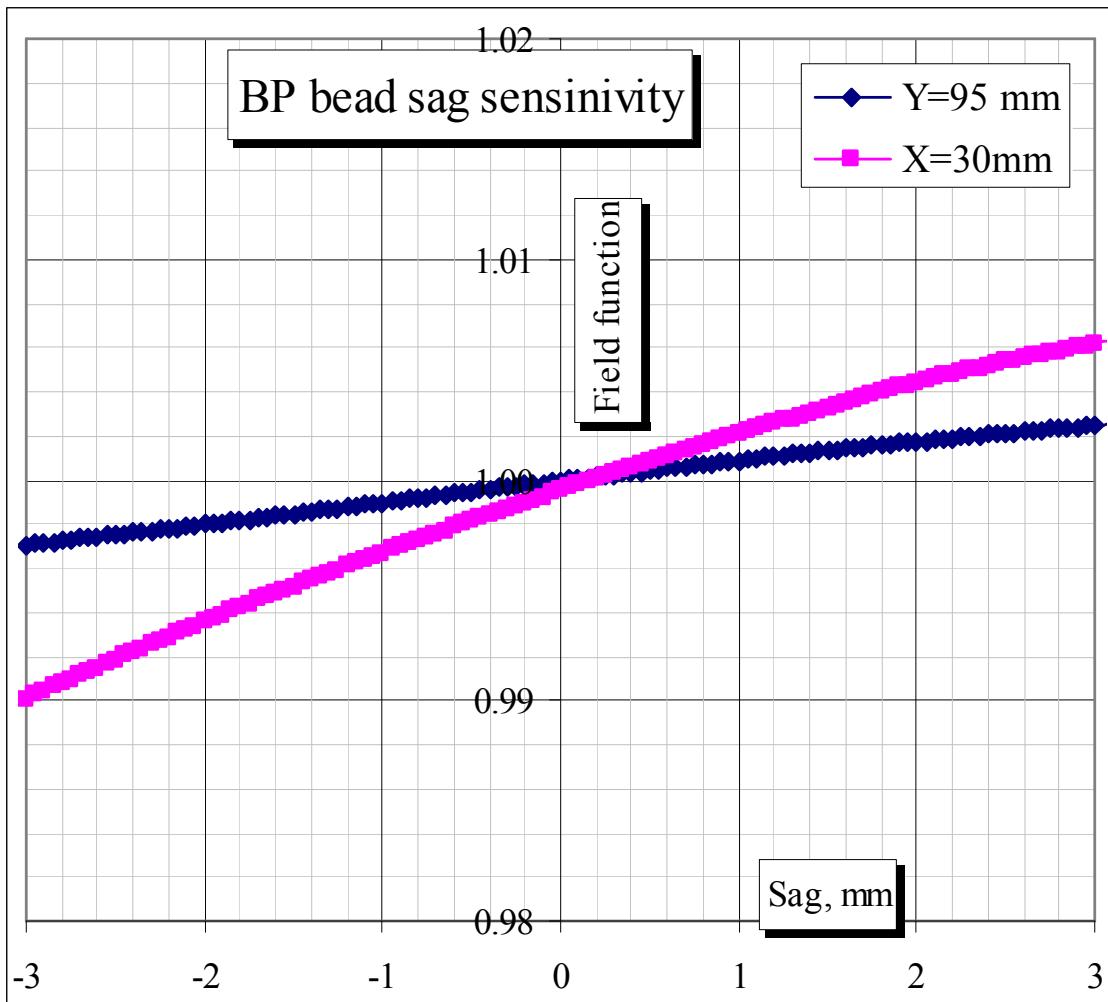
Electric field component of bead pull.



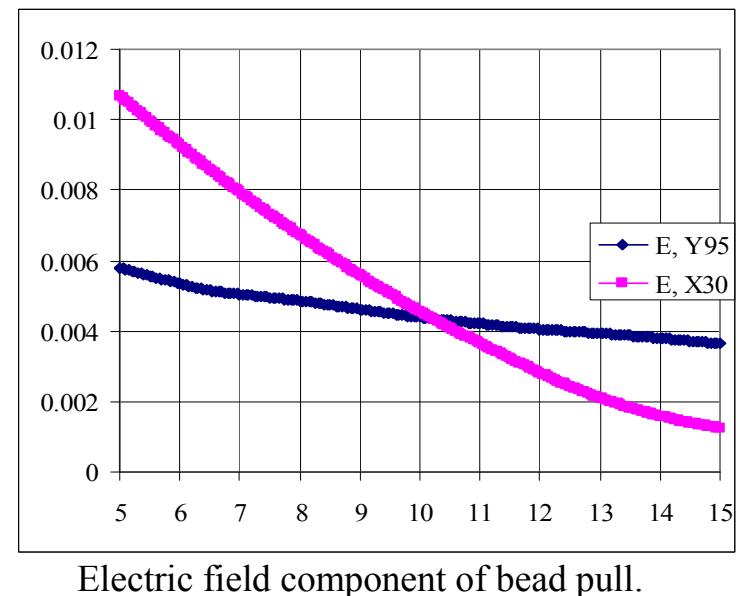
Magnetic field component of bead pull.

Bead pull measurement line located parallel to beam line in the corner between equator and wane of the RFQ. In the plane perpendicular to the beam line position is X~30mm, Y~95 mm. In this area magnetic component of the field is dominant. Sensitivity to the positioning is low, because of good uniformity of the magnetic field in bead pull area.

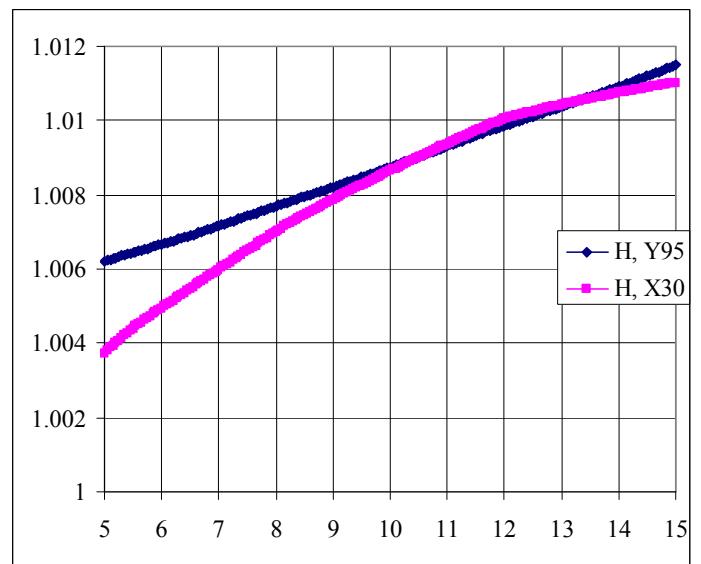
Bead-pull sensitivity on bead position, HFSS data.



Sensitivity in positioning along line X=30mm, parallel to wane center plane, is more. Sensitivity in positioning along line Y=95mm, perpendicular to wane center plane, is less. Earth gravity bead in the direction perpendicular to wane in quadrants 1 and 3.

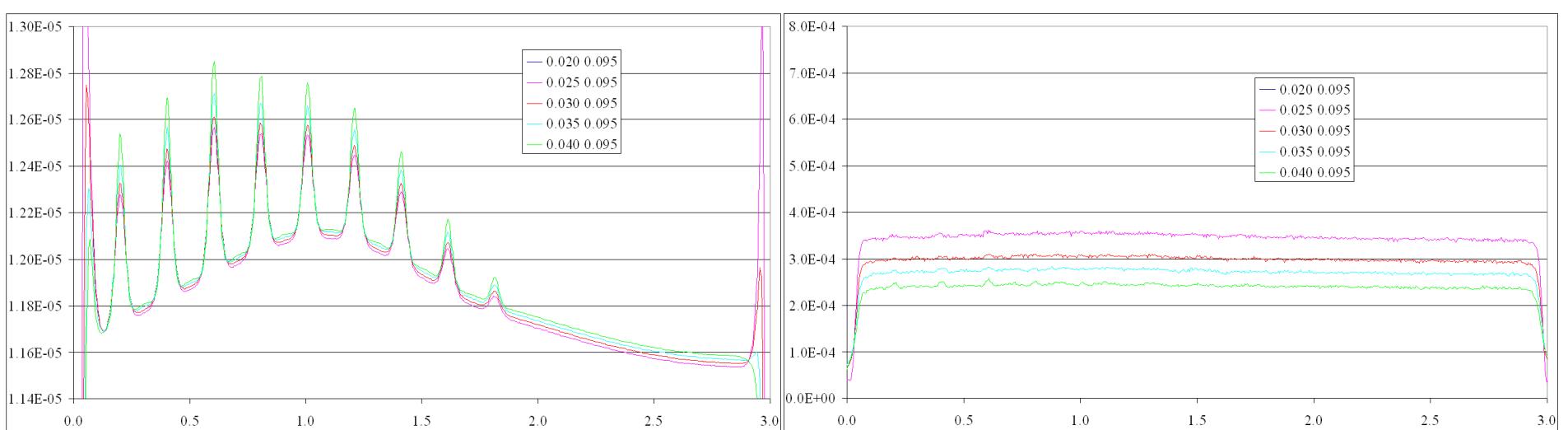
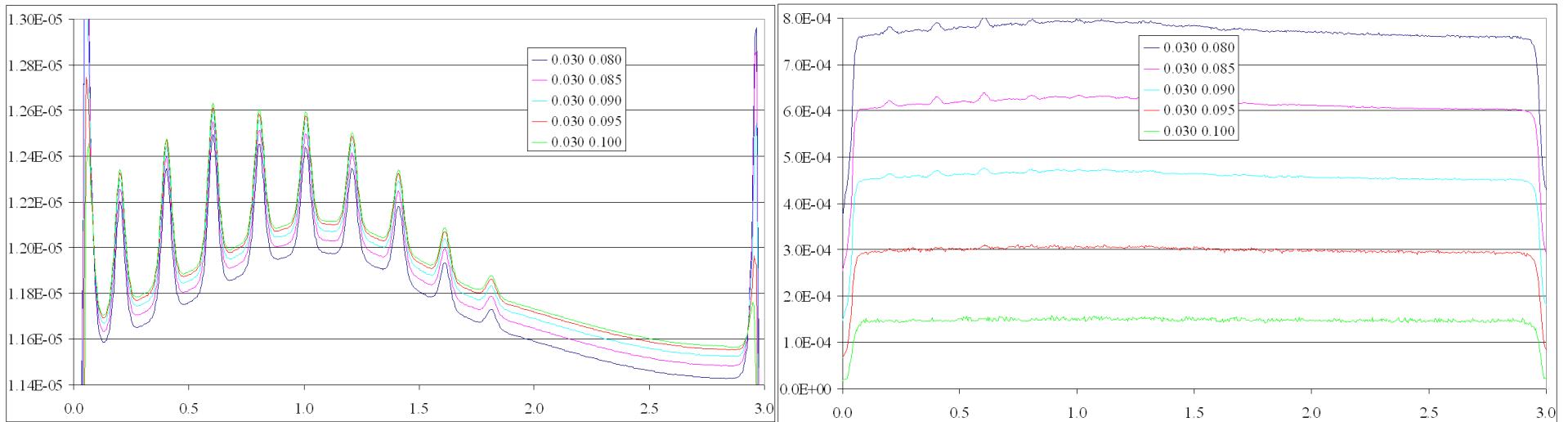


Electric field component of bead pull.



Magnetic field component of bead pull.

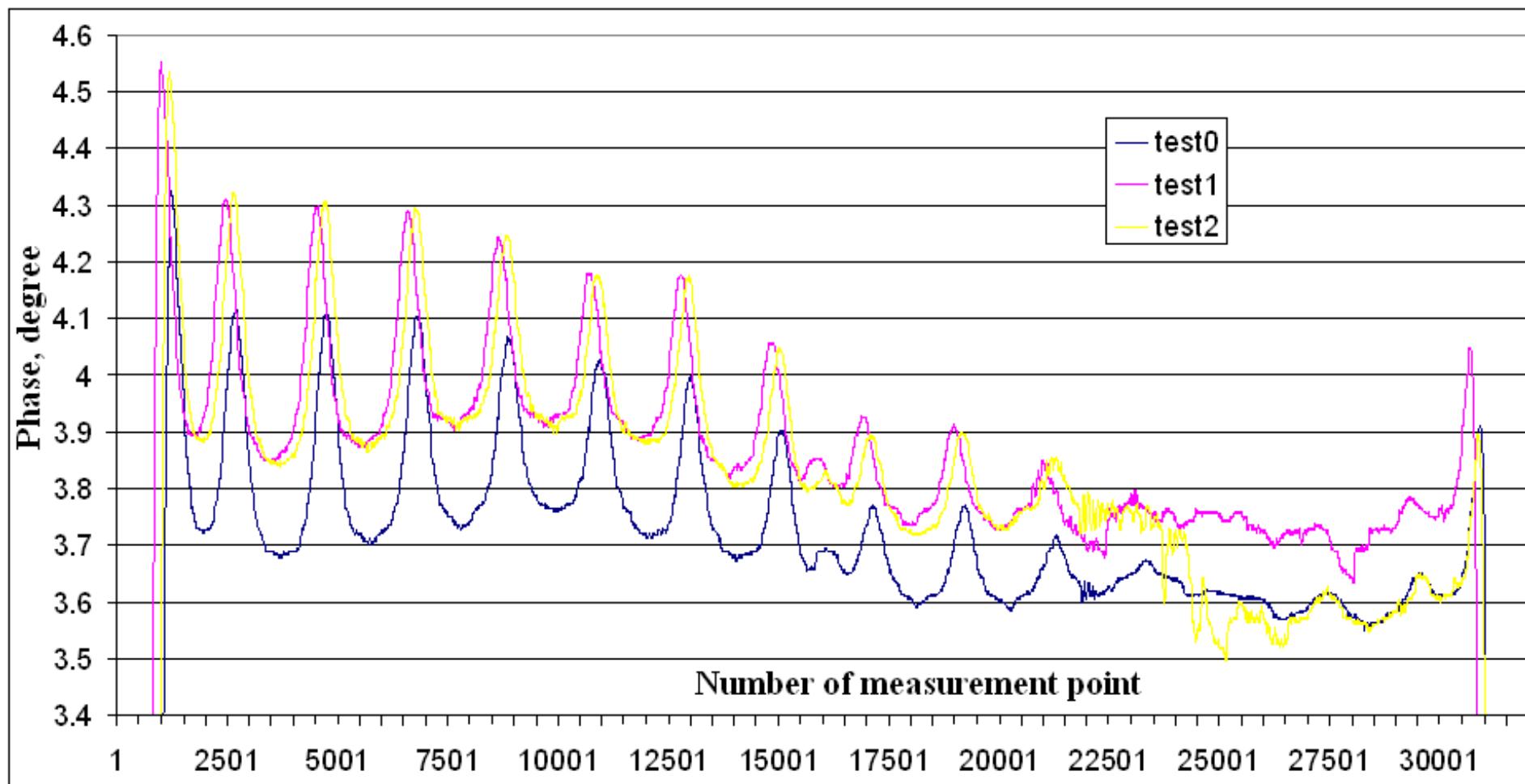
HFSS calculations of the RFQ with slug tuners installed with recommended penetration. H and E fields near bead pull area.



Sensitivity in positioning along line Y=95mm, perpendicular to wane center plane. Magnetic (leftplot) and electric (right) fields. Spikes related with perturbation of the field by tuners. Closer to tuner and larger tuner penetration more field perturbation.

F, MHz	Slug		3.76
325.023	326.276		3.56
			1.0277
99.822	17.523	95.19	30.055

Three set of the bead pull measurements done by AccSys.



Bead pull measurements done at AccSys.

RFQ bead pull at AccSys, 2008.06.17

max min

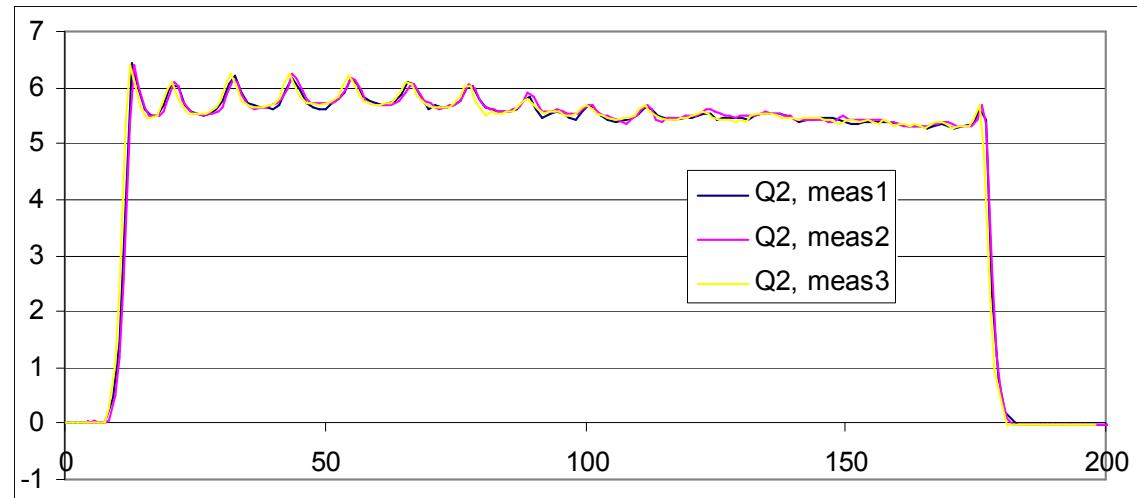
Q1	5.49	5.04	1.044
	5.52	5.09	1.041
	5.56	5.14	1.040
			1.042

Q2	5.69	5.3	1.036
	5.69	5.3	1.036
	5.69	5.32	1.034
			1.035

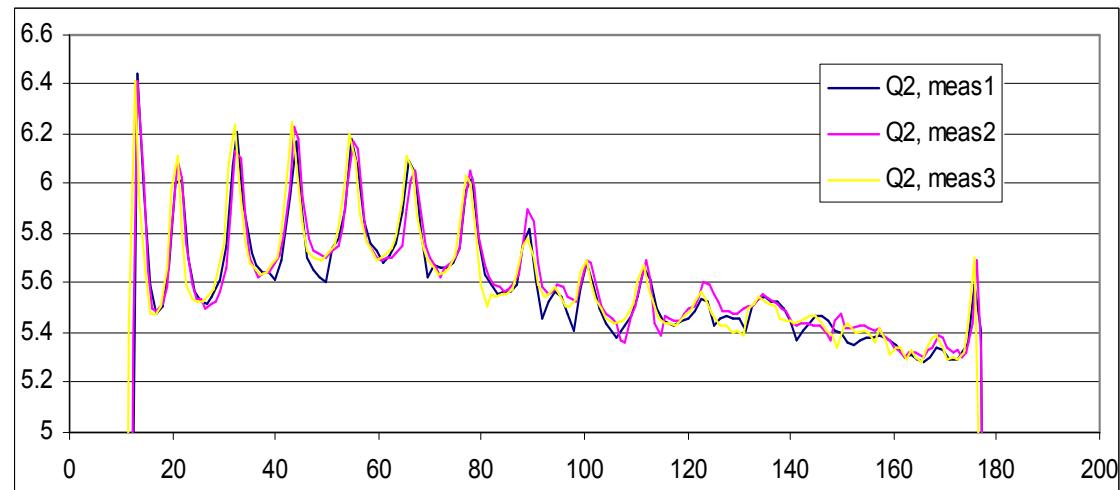
Q3	5.68	5.473	1.019
	5.63	5.474	1.014
	5.715	5.465	1.023
			1.019

Q4	5.22	4.94	1.028
	5.63	5.474	1.014
	5.715	5.465	1.023
			1.022

Q4	5.12	4.84	1.029
	5.14	4.88	1.026
	5.01	4.78	1.024
			1.026



To reduce measurement error three bead pull measurements were done in each quadrant.



Field probes calibration done at AccSys.

RFQ field probe signals, 2008.06.17.

F= 324.93

Quad1

Quad2

Quad3

Quad4

	S21	Phase	S21	Phase	S21	Phase	S21	Phase
Pos1	-44.47	-136.24	-44.31	37.38	-44.32	25.57	-44.04	43.97
Pos2	-44.21	48.79	-44.28	-138.12	-43.98	-163.90	-44.08	-166.53
Pos3	-44.12	-178.51	-44.50	-139.69	-44.39	-137.16	-44.45	38.17

Initially probe were calibrated to 40 dB transmission attenuation.

We adjusted the to 50 dB transmission attenuation.

After reducing of the coupling, 2008.06.17.

F= 324.93

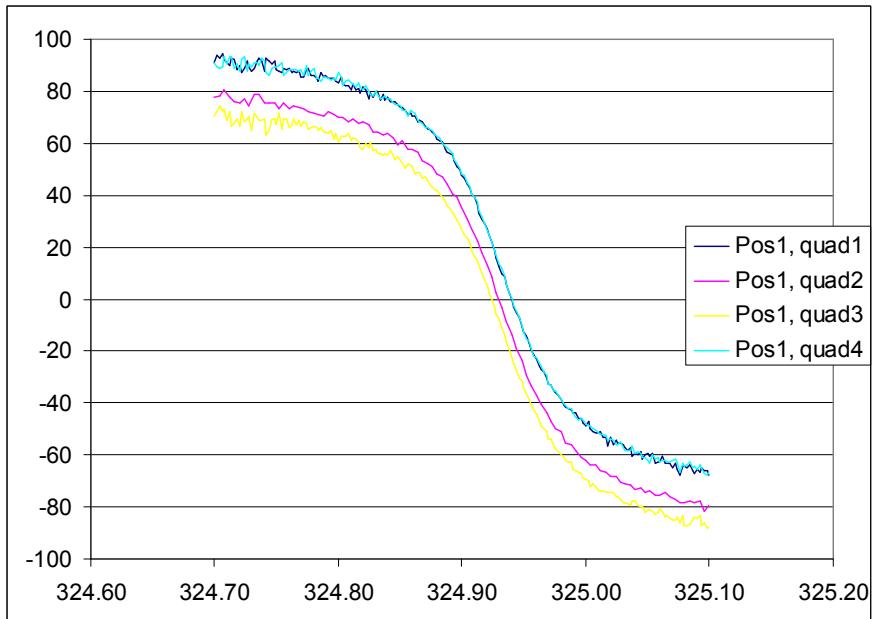
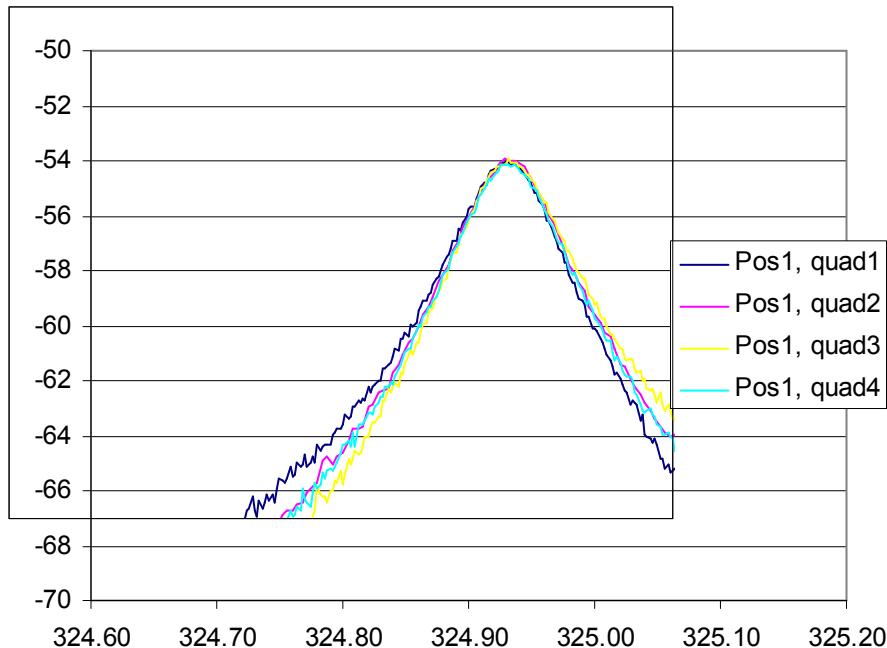
Quad1

Quad2

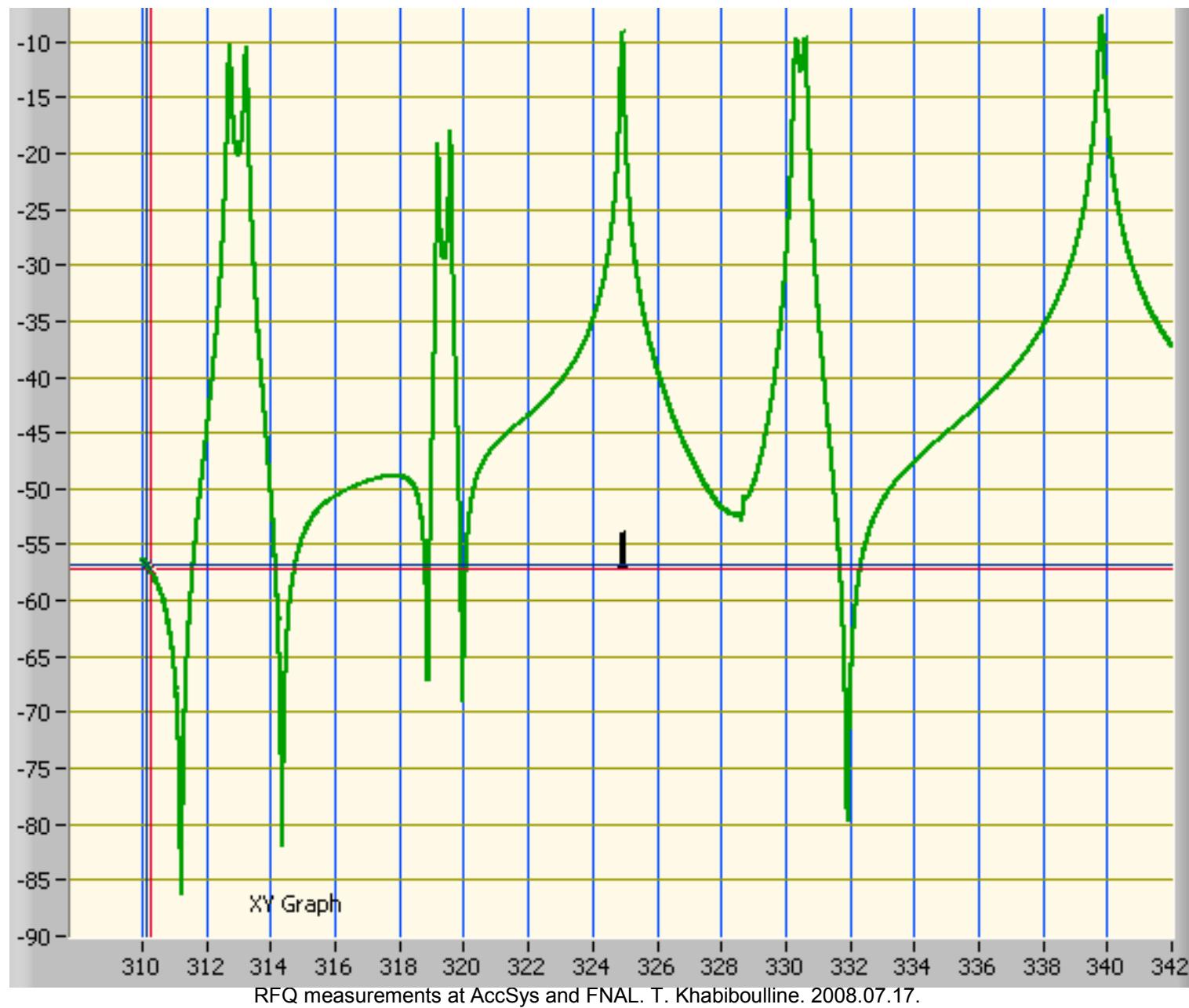
Quad3

Quad4

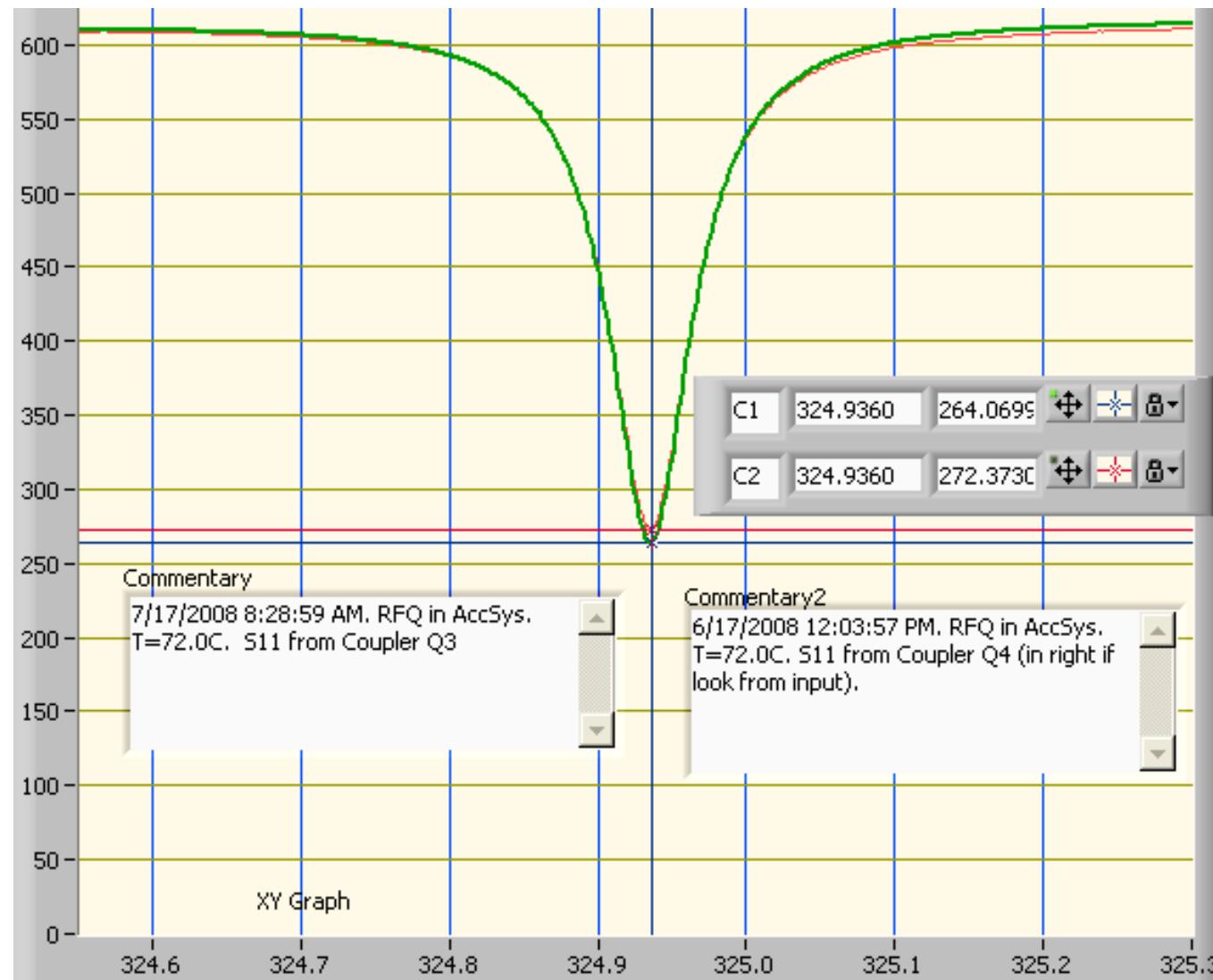
	S21	Phase	S21	Phase	S21	Phase	S21	Phase
Pos1	-54.08	9.73	-54.03	-8.49	-53.91	-10.79	-54.13	11.84
Pos2	-54.07	10.56	-54.10	0.25	-54.15	-25.65	-54.02	-26.50
Pos3	-53.95	2.53	-54.12	-1.11	-53.97	-0.64	-54.13	-5.20

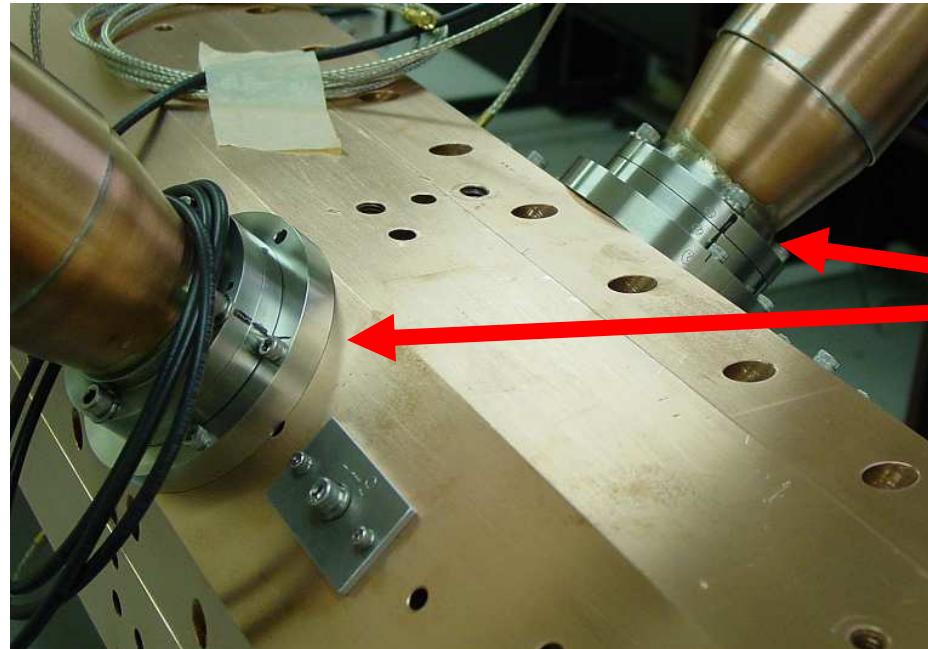


Frequency measurements done at AccSys. F=324.935 MHz, Q=3943.

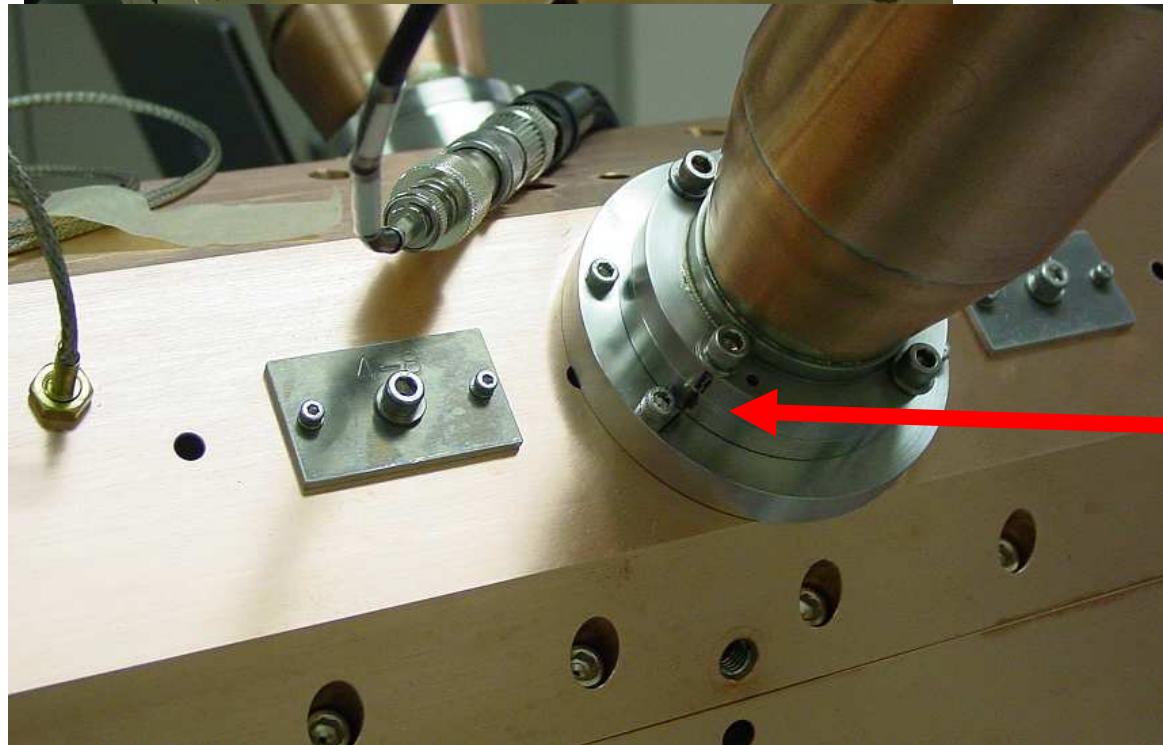


Power couplers measurements done at AccSys.

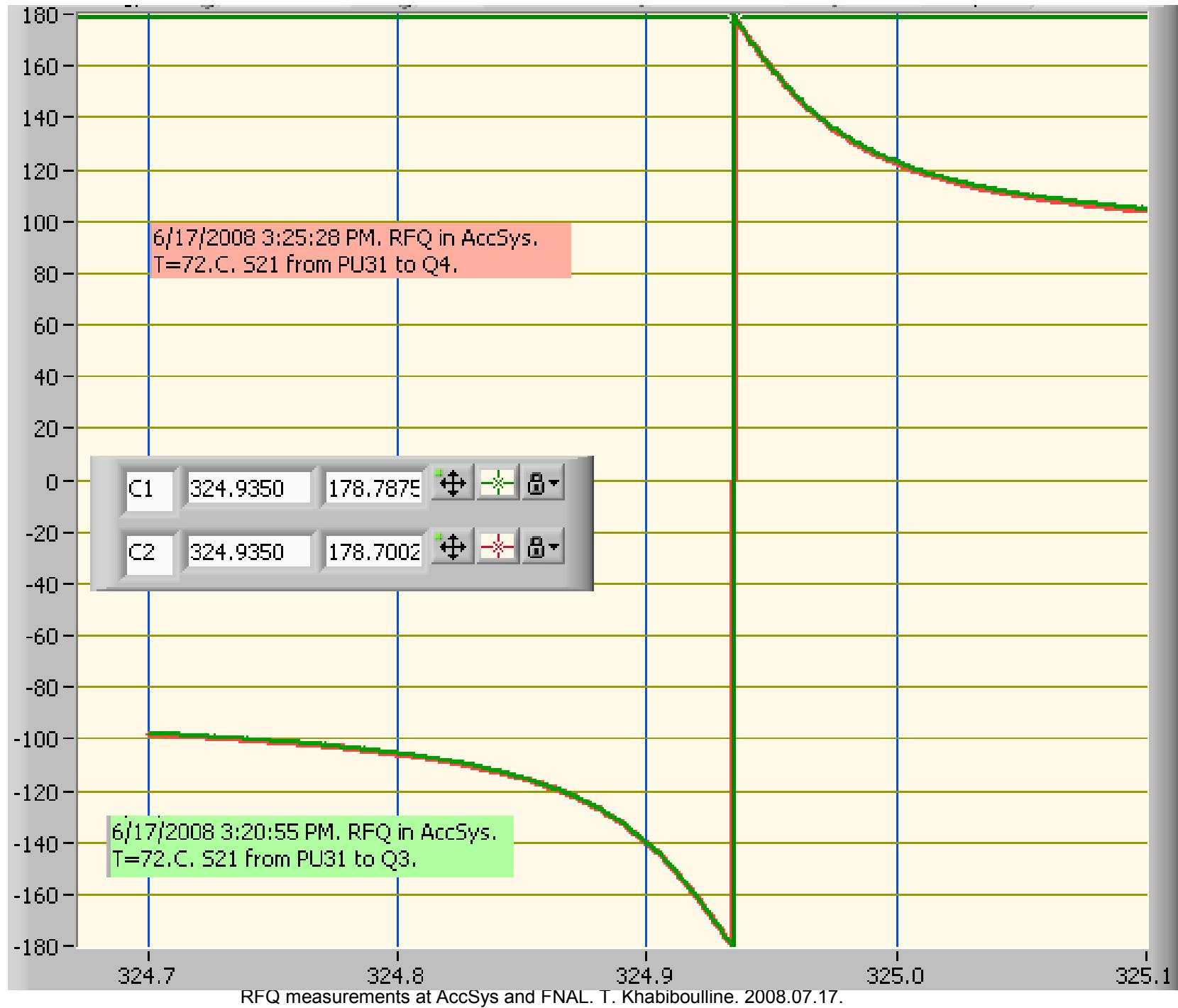


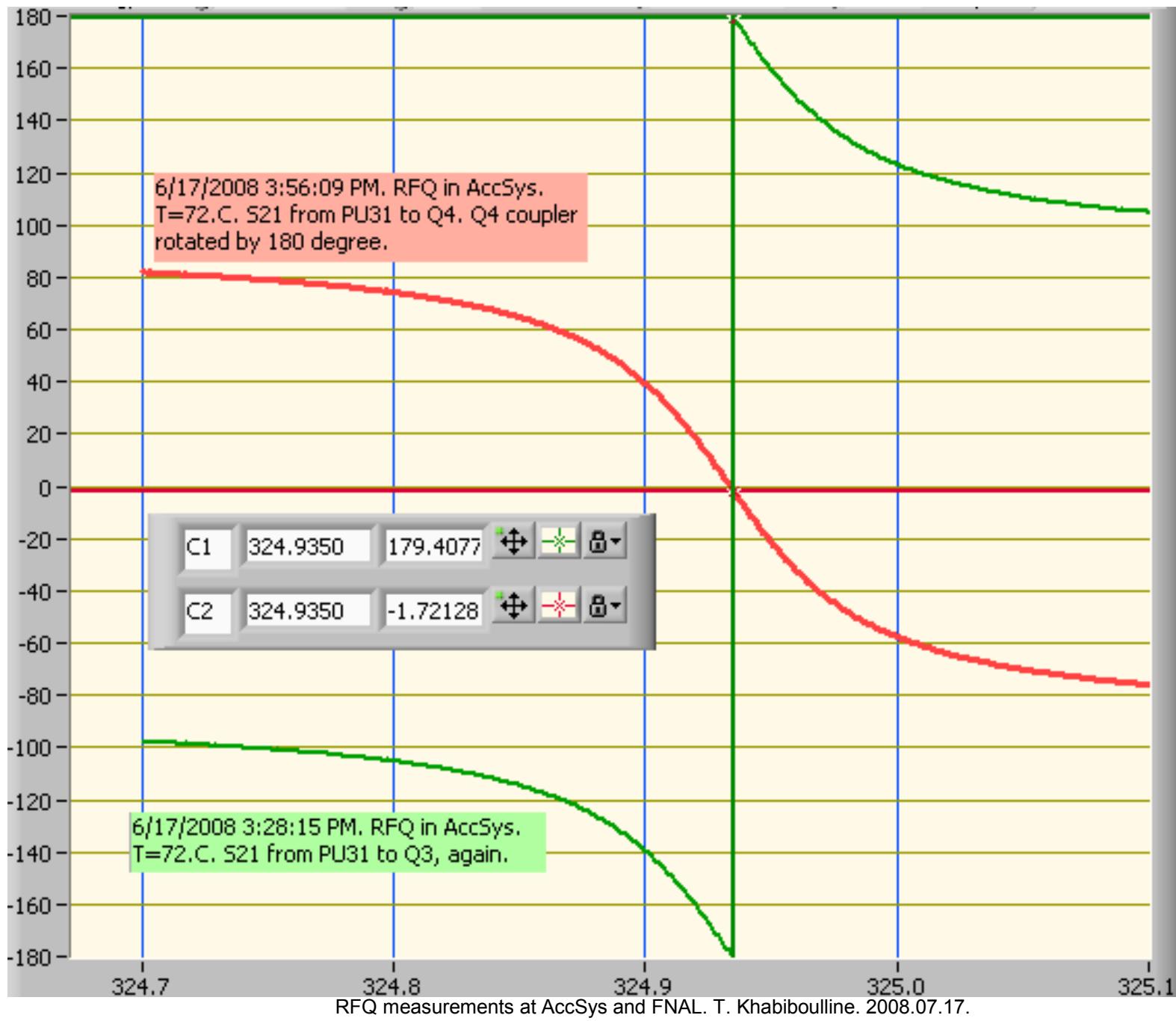


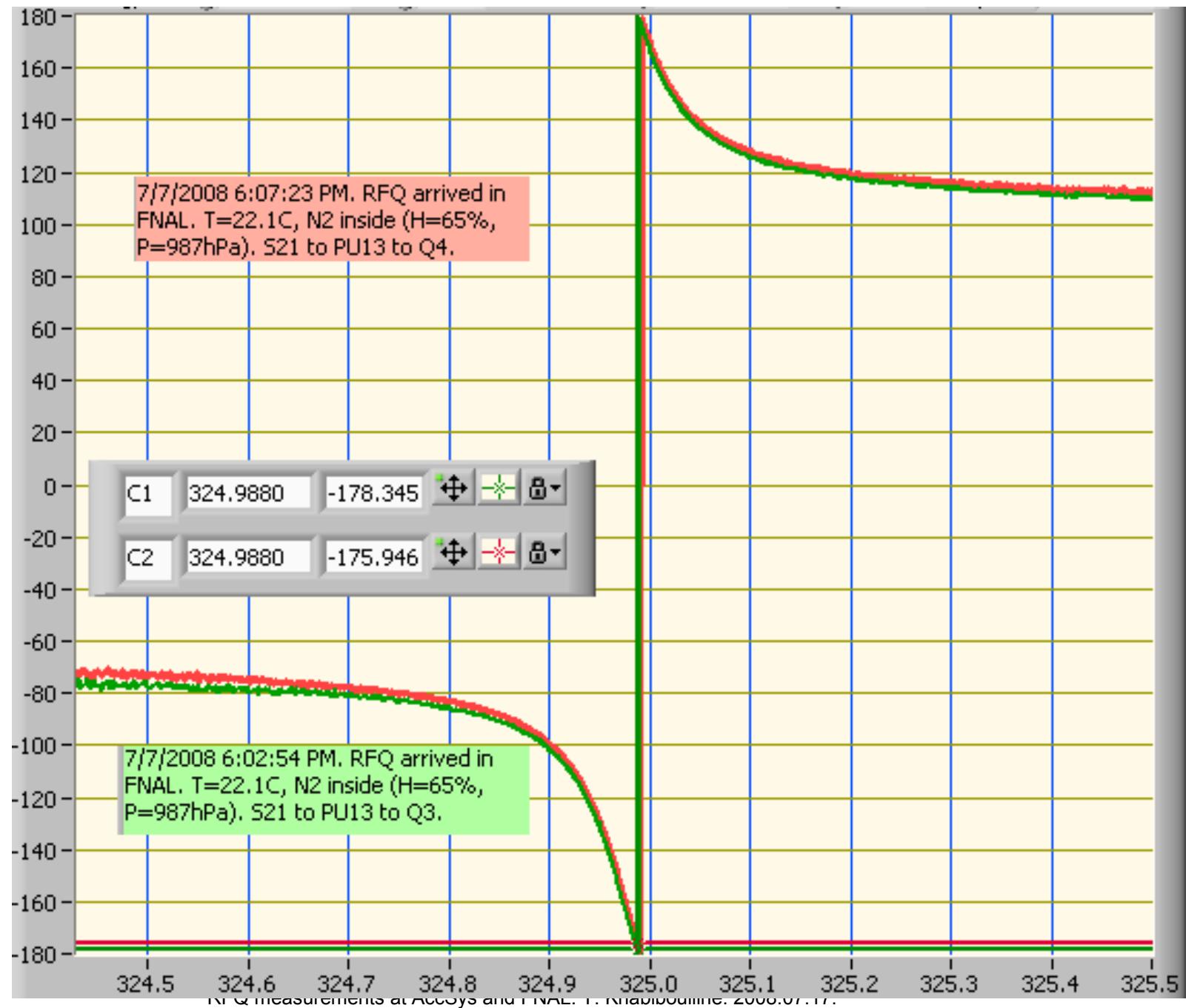
Initial positions
of the power couplers

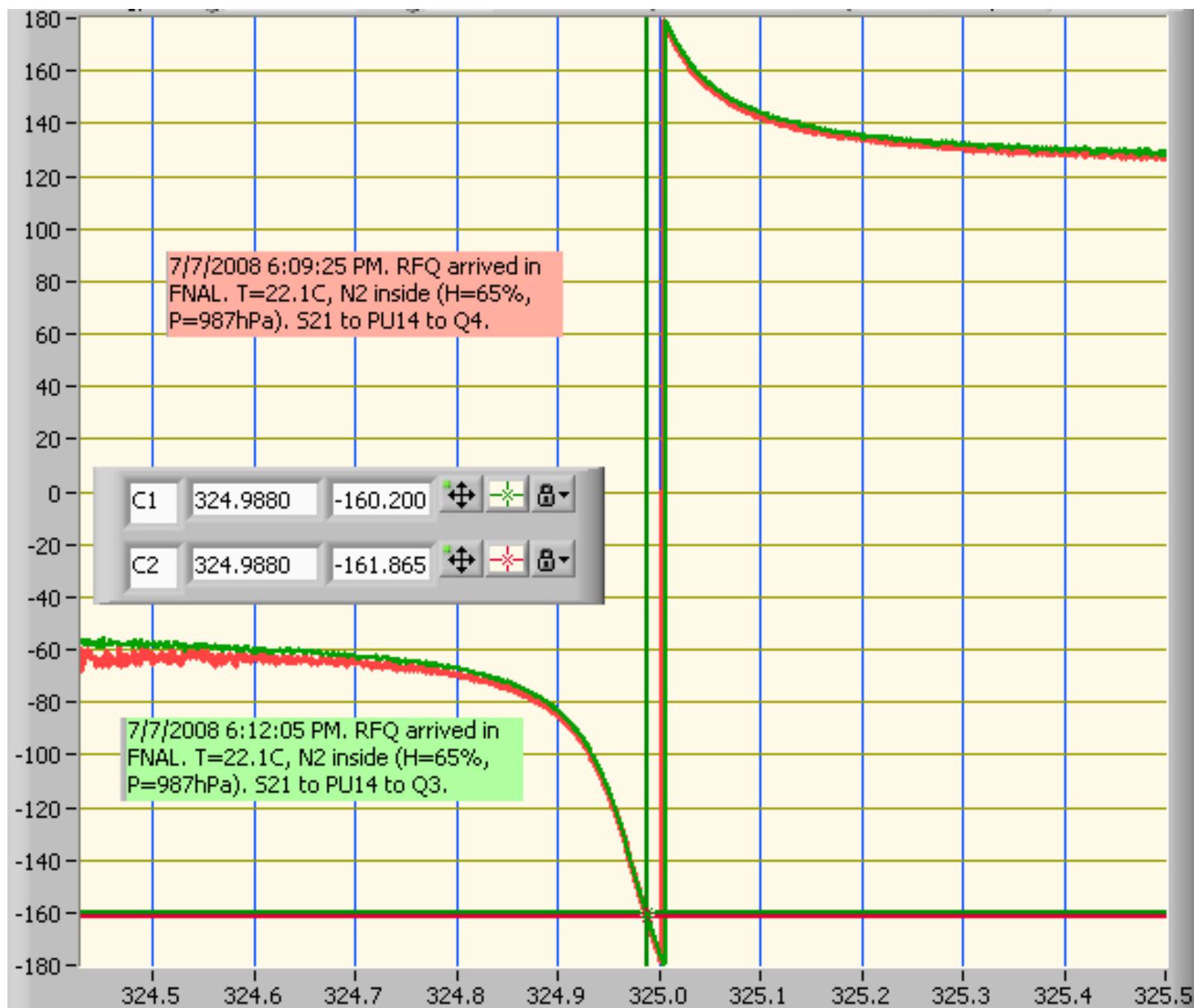


Positions of the
power couplers after
rotating of the
coupler Q3.



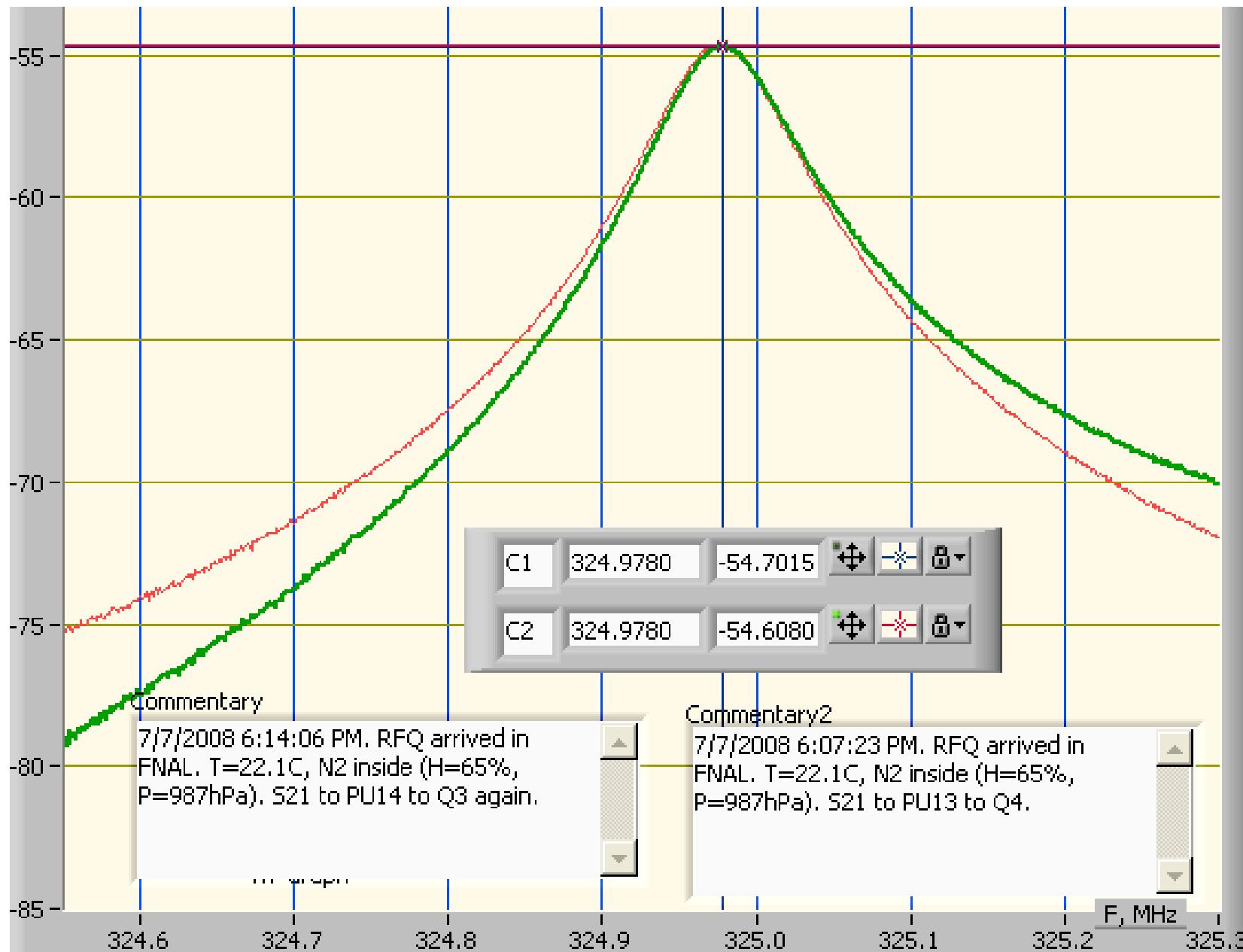






RFQ measurements at AccSys and FNAL. T. Khabiboulline. 2008.07.17.

Power couplers measurements done at FNAL.



Frequency measurements done at AccSys and FNAL.



Frequency spectrum, MHz								
	D11	D12	D21	D22	M1	D31	D32	M2
AccSys	312.732	312.246	319.208	319.598	324.935	330.346	330.622	339.828
FNAL	312.694	312.368	319.082	319.82	324.998	330.242	330.828	339.878

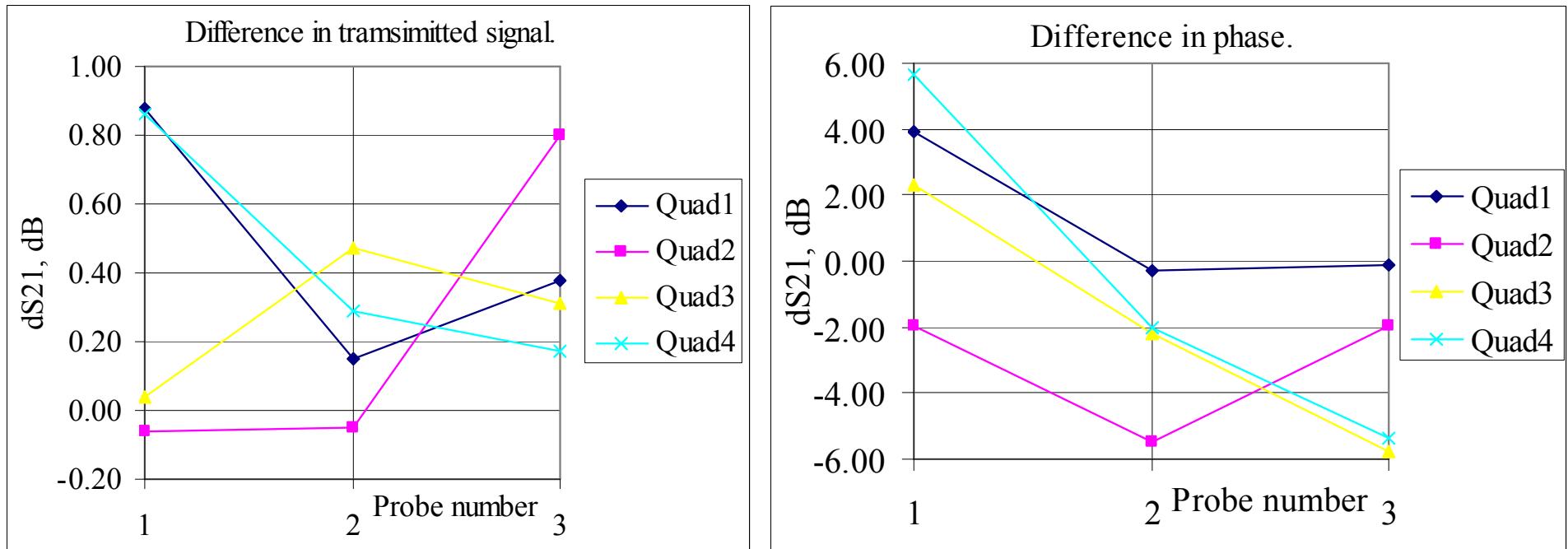
RFQ measurements at AccSys and FNAL. T. Khabiboulline. 2008.07.17.

Field probes measurements at AccSys and FNAL.

RFQ field probe signals, 2008.06.17 and 2008.0707.									
	Quad1		Quad2		Quad3		Quad4		
	S21	Phase	S21	Phase	S21	Phase	S21	Phase	
Pos1	-44.47	-136.24	-44.31	37.38	-44.32	25.57	-44.04	43.97	
Pos2	-44.21	48.79	-44.28	-138.12	-43.98	-163.90	-44.08	-166.53	
Pos3	-44.12	-178.51	-44.50	-139.69	-44.39	-137.16	-44.45	38.17	
After reducing of the coupling, 2008.06.17.							F=	324.93	
	S21	Phase	S21	Phase	S21	Phase	S21	Phase	
Pos1	-54.08	9.73	-54.03	-8.49	-53.91	-10.79	-54.13	11.84	
Pos2	-54.07	10.56	-54.10	0.25	-54.15	-25.65	-54.02	-26.50	
Pos3	-53.95	2.53	-54.12	-1.11	-53.97	-0.64	-54.13	-5.20	
In FNAL									
Pos1	-56.06	131.80	-55.07	119.46	-55.05	112.89	-56.09	132.18	
Pos2	-55.32	136.86	-55.15	131.74	-55.72	102.57	-55.41	101.51	
Pos3	-55.43	128.65	-56.02	126.86	-55.38	131.12	-55.40	126.19	
	1.10	126.00							
Pos1	0.88	3.93	-0.06	-1.95	0.04	2.32	0.86	5.66	
Pos2	0.15	-0.30	-0.05	-5.49	0.47	-2.22	0.29	-2.01	
Pos3	0.38	-0.12	0.80	-1.97	0.31	-5.76	0.17	-5.39	
	S21, dB	Phase							

RFQ measurements at AccSys and FNAL. T. Khabiboulline. 2008.07.17.

Field probes measurements summary.



Quad1	Quad2	Quad3	Quad4		
0.941	1.049	1.037	0.943	0.992	Pos 1
1.024	1.048	0.987	1.007	1.016	Pos 2
0.997	0.950	1.005	1.021	0.993	Pos 3
0.987	1.015	1.009	0.991	Average	

Although reading from individual probes changed up to 5%, averaged values per quadrant and position changed less than 2%.